New Data Compilations

BRL-R-1458. Formation of Ions in Ionized Air. NILES, F. E., Ballistic Research Laboratories, Aberdeen Proving Grounds, Md., November 1969. 54 pp. Available from DDC.

Schematic representations are given for both the formation of positive ions and the formation of negative ions in ionized air. The formation of positive ions can be divided into three regions. Region I contains the ionization of neutral constituents and two body reactions in dry air. Region II contains reactions involving ionic species which are formed by three-body reactions. Region III contains reactions requiring water vapor and shows the formation of the hydrated hydronium ions. The formation of negative ions proceeds predominantly through O_2^-. The clustering of neutral molecules to O_2^- opens additional channels for the formation of NO_3^-, an ion which is not attacked by atomic oxygen. Rate constants are given, including the experimental values on which they are based, for the reactions in the schematic representations.

DMIC Report S-28. Plane-Strain Fracture-Toughness Data for Selected Metals and Alloys. CAMPBELL, J. E., Defense Metals Information Center, Battelle Memorial Institute, Columbus, Ohio, June 1968. 26 pp. Available from DDC.

Plane-strain fracture-toughness (K_{Ic}) parameters may be used to estimate critical flaw sizes in structural metals subjected to known stresses at specified temperatures. Previous toughness parameters for evaluating high-strength alloys provided only empirical data that could not be used directly in design. This report contains the first compilation of available K_{Ic} data and is the result of considerable interest during the past few years in developing test methods for obtaining these data. The report is divided into sections on: aluminum alloys, high-strength alloy steels, intermediate- and low-strength steels, precipitation-hardening stainless steels, titanium alloys, nickel-base alloy 718, and beryllium. Data on the aluminum alloys are limited to the 2000- and 7000-series alloys. The high-strength alloy steels include the maraging steels, 9Ni-4Co steels, and lower alloy steels such as AISI 4340, D6ac, 300M, and H-11. The intermediate-strength steels include those that have been considered for submarine hulls, atomic-reactor vessels, and steam-turbine rotors. Data for the stainless steels are limited to the precipitation-hardening grades.

NSRDS-NBS 32. Phase Behavior in Binary and Multicomponent Systems at Elevated Pressures: *n*-Pentane and Methane-*n*-Pentane. VIRGINIA M. BERRY AND B. H. SAGE. Chemical Engineering Laboratory, California Institute of Technology, Pasadena, Calif. 91109, June 1970. 66 pp. Available from U.S. Government Printing Office, Washington, D.C. 20402—Price $0.70.

This paper, which is concerned with the critical evaluation of data on the phase behavior of binary systems, consists of three parts. In the first part the rationale of the evaluation process used is discussed, in the second the behavior of *n*-pentane, and in the third the behavior of the system methane–*n*-pentane. The properties of *n*-pentane considered are the critical constants and the vapor pressures and densities of the saturated coexistent phases as functions of temperature. For the methane–*n*-pentane system the compositions and densities of the coexisting phases are given as functions of temperature and total pressure. Data for the unique states of the two-component system are also presented. Discussions are given of the reliability of the selected values and of the differences between the selected values and various measured values.

NSRDS-NBS 33. Electrolytic Conductance and the Conductances of the Halogen Acids in Water. WALTER J. HAMER AND HAROLD J. DEWANE. Institute for Basic Standards, National Bureau of Standards, Washington, D.C. 20234, May 1970. 32 pp. Available from U.S. Government Printing Office, Washington, D.C. 20402—Price $0.55.

Definitions, symbols, general principles, and general laws related to the electrolytic conductance of aqueous solutions are presented. The general laws considered are Coulomb's law for charged bodies, Poisson's equation relating the electrostatic potential to charge distribution, and the Stokes and Oseen laws for the velocity of a sphere in a fluid medium. The relations between electrical resistance, electrical conductance, specific resistance, specific conductance, and equivalent conductance are set forth. Theoretical expressions for the equivalent conductance as derived by Debye, Onsager, and Fuoss are given in general form and in a somewhat more detailed fashion in an appendix. The general methods of treating the equivalent conductances of ionophores and ionogens, especially in regard to the determination of the limiting equivalent conductance, the degree of ionic association, and the degree of ionic dissociation are discussed. Data on the equivalent conductances of the halogen acids, hydrofluoric, hydrochloric, hydrobromic, and hydriodic acids in water are given for a wide range of concentration and temperature.

Yttrium, Properties, Phase Diagrams, Industrial Applications. V. F. TEREKHOVA AND E. M. SAVITSKII. D. SLUTZKIN (ED.), R. KONDOR (TRANS). AEC-tr-55016, Israel Program for Scientific Translations, Jerusalem, Israel, 1970. 167 pp. Available from CFSTI, TT 69-55016.

The authors have attempted to generalize the available literature data on the preparation and properties of yttrium and the phase diagrams and properties of its alloys. The technological and mechanical properties as well as the physical, chemical, magnetic, and electrical properties are discussed along with such topics as recrystallization, metallography, and single crystals. Almost all of the available binary and ternary phase diagrams are presented in the alloy section.

Handbook of Air Pollution. J. P. SHEEHY, W. C. ACHINGER, AND R. A. SIMON. Public Health Service Publication No. 999-AP-44, National Center for Air Pollution Control, Public Health Service, Durham, N.C., October 1969. 233 pp. Available from Superintendent of Documents, GPO.

This handbook was designed to consolidate the applicable portions of numerous references to a single easily accessible source. The primary consideration for inclusion in the handbook is that the information is unlikely to be changed. This, then, has excluded experimental results and data on air quality. The one exception to this general rule is the section on medical aspects. The experimental data that are included here are widely accepted in the field of biological experimentation. The sections included in the handbook are general—time; temperature; lengths; area; velocity; capacities, volumes and flow rates; mass; pressure; properties of particulates; water vapor; properties of gases; properties of air; properties of potential pollutants; miscellaneous conversion factors; medical; mathematics; and a bibliography.

These documents have been reviewed by the Editorial Board of the National Bureau of Standards.